paratively superficial, and do not disturb the general continuity of the mass in which they occur. The water contained in these crevices is only the principal vehicle of the force which acts upon it: and the irresistible energy with which the whole icy mass descends from hour to hour with a slow but continuous motion bespeaks of itself the operation of a fluid pressure acting on a ductile or plastic material.

March 5, 1846.

The MARQUIS OF NORTHAMPTON, President, in the Chair.

"On the Physics of Media that are composed of free and perfectly elastic Molecules in a state of Motion." By J. J. Waterson, Esq. Communicated by Captain Beaufort, R.N., F.R.S.

This memoir contains the enunciation of a new theory of heat, capable of explaining the phenomena of its radiation and polarization, and the elasticity of various bodies, founded on the hypothesis of a medium consisting of a vast multitude of minute particles of matter endowed with perfect elasticity, and enclosed in elastic walls, but moving in all directions within that space, with perfect freedom, and in every possible direction. In the course of these motions, the particles must be supposed to encounter one another in every possible manner, during an interval of time so small as to allow of their being considered infinitesimal in respect to any sensible period; still, however, preserving the molecular *vis viva* constant and undiminished.

The author then enters into extensive analytical investigations; first, of the conditions that determine the equilibrium of such a homogeneous medium, as is implied by the hypothesis, and of the laws of its elasticity; secondly, of the physical relations of media that differ from each other in the specific weight of their molecules; thirdly, of the phenomena that attend the condensing and dilating of media, and of the mechanical value of their molecular *vis viva*; fourthly, of the resistance of media to a moving surface; fifthly, of the vertical equilibrium of a medium surrounding a planet and constituting its atmosphere; and lastly, of the velocity with which impulses are transmitted through a medium so constituted.

In an Appendix, the author enters into a full explanation of a table of gases and vapours, drawn up with reference to the subjects discussed in his paper.

March 12, 1846.

The MARQUIS OF NORTHAMPTON, President, in the Chair.

"On the Blow-hole of the Porpoise." By Francis Sibson, Esq. Communicated by Thomas Bell, Esq., F.R.S.

The external opening of the air-passage of the porpoise is so

situated at the upper part of the head as to admit of the animal's breathing while only a small portion of its head is above the water. In its descent through the skull, between the cranial and facial bones, the tube is divided by a thin plate of bone into two nasal canals, which form, below this partition, a single muscular tube opening at its lower part into the pharynx by a constricted aperture, through which the larynx projects upwards quite through the pharynx, dividing it into two channels. A series of pouches, five in number, capable of great dilatation, and provided with a muscular apparatus for retaining or expelling their contents, communicate by large orifices with the nasal canals, and appear to correspond in situation with the antra, frontal sinuses and ethmoid cells. The author gives a minute anatomical description of these muscles, and an account of their modes of action; the adjustments of the apparatus being such that the outer passage may be closed or opened above or below the anterior pouches. When the outer passage is closed, the posterior pouches can be distended and the anterior emptied; while the converse may be effected when the passage is open. The use of the pouches appears to be to buoy up the head, so that on the porpoise rising from deep water, the opening for breathing comes first to the surface and admits of the animal's sleeping in that position, while its whole body remains immersed in the water.

"On Motion in the Lumbar Division of the Spine in Birds." By George Oakley Fleming, M.D., F.L.S. Communicated by Thomas Bell, Esq., F.R.S.

The author gives quotations from the works of Cuvier, Blumenbach, Tiedemann, Macartney, Vicq d'Azyr, Carus, Earle, and Roget, in proof of its being the prevalent opinion among comparative physiologists that the dorsal and lumbar portions of the spine form altogether a rigid structure, not admitting of the least perceptible flexion. But from his observations of the form of the articulating surfaces of the lumbar vertebræ, which appear to be adapted to lateral motion, the author was led to conclude that, although flexion in the mesial plane is effectually prevented, some degree of lateral flexion actually takes place. The number of articulations in this part of the spine, he observes, varies in different birds: thus in the sea-gull, there are several articulations in the dorsal and lumbar portions; while, in the peacock, there is only one moveable vertebra; the remaining dorsal being united together, and all the lumbar vertebræ being consolidated and anchylosed with the sacrum; thus forming two firm and immoveable pieces between which the moveable vertebra is placed. The flexion of the spine forwards is prevented by the great breadth of the spinous processes and their projections at right angles to the bodies of the vertebræ; and frequently also by the addition of a number of thin, flat long bones which are applied by their flat surfaces on each side of the spinous processes; and also by strong flat ligaments, situated between each spinous process, like the ligamentum nuchæ of herbivorous quadrupeds. For the purpose of guarding against pressure on the spinal cord during the lateral flexion of